

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE



In re: Applicant: Rudolf BOHDAL
Application No: 10/564,076
Title: **METHOD FOR MAKING GAS TURBINE
ELEMENTS AND CORRESPONDING ELEMENT**

Filed: January 10, 2006
Art Unit: 3745
Examiner: Sean Jerrard YOUNGER
Confirmation No. 6000
Customer No.: 23280
Docket No.: 5038.1019

Mail Stop: APPEAL BRIEF – PATENTS
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

August 9, 2010

APPELLANT'S BRIEF UNDER 37 C.F.R. § 41.37

Sir:

Appellant submits this brief for the consideration of the Board of Patent Appeals and Interferences (the "Board") in support of their appeal of the Final Rejection dated January 6, 2010 in this application. The statutory fee of \$540.00 for filing an appeal brief is paid concurrently herewith.

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REAL PARTY IN INTEREST

The real party in interest is MTU Aero Engines GmbH, a corporation having a place of business in Muenchen, Germany and the assignee of the entire right, title and interest in the above-identified patent application. The invention was assigned to MTU Aero Engines GmbH by an assignment from inventor Rudolf BOHDAL. The assignment was recorded on January 10, 2006 at reel 017484 frame 0570.

I. RELATED APPEALS AND INTERFERENCES

Appellant, his legal representatives, and assignee are not aware of any appeal, interference or judicial proceeding that directly affects, will be directly affected by, or will have a bearing on the Board's decision in this appeal.

II. STATUS OF CLAIMS

Claims 1 to 16, 20, and 30 have been cancelled. Claims 17 to 19, 21 to 29, and 31 to 42 are pending. Claims 17 to 19, 21 to 29, and 31 to 42 have been finally rejected as per the Final Office Action dated January 6, 2010. The rejections to claims 17 to 19, 21 to 29, and 31 to 42 thus are appealed. A copy of pending claims 17 to 19, 21 to 29, and 31 to 42 is attached hereto as Appendix A.

III. STATUS OF AMENDMENTS AFTER FINAL

No amendments to the claims were filed after the final rejection. A Notice of Appeal was filed on June 2, 2010 and received by the U.S.P.T.O. on June 7, 2010.

IV. SUMMARY OF THE CLAIMED SUBJECT MATTER

Independent claim 17 recites a method for manufacturing vane segments for a gas turbine comprising (e.g., see paragraph [0015]) the steps of:

providing a plurality of vanes (e.g., see paragraph [0021], and guide vanes 19 in Fig. 2),
manufacturing a vane segment (e.g., see paragraph [0022] and vane segment 18 in Fig. 2)

from the plurality of vanes (e.g., see paragraph [0019] and guide vanes 19 in Fig. 2) via powder metallurgy injection molding (e.g., see paragraph [0023]), the step of manufacturing including the steps of:

mixing a metal powder having a binding agent to form a homogeneous material (see, e.g. paragraph [0016], and steps 10, 11, and 12 in Fig. 1), the metal powder accounting for at least 50% of the homogeneous material (see, e.g. paragraph [0016]);

forming at least one molded body from the homogeneous material via injection molding (see, e.g. paragraph [0017], and step 13 in Fig. 1)

subjecting the at least one molded body to a debinding process (see, e.g. paragraph [0018], and step 14 in Fig. 1), and

compressing the at least one molded body via sintering to form the vane segment (see, e.g. paragraph [0019], and step 15 in Fig. 1).

Independent Claim 29 recites a component for a gas turbine (e.g., see paragraph [0015]), comprising

a guide vane segment (e.g., see paragraph [0022], and vane segment 18 in Fig. 2) manufactured from a plurality of guide vanes (e.g., see paragraph [0022], and guide vanes 19 in Fig. 2) via powder metallurgy injection molding (e.g., see paragraph [0023]) from a homogeneous material comprising at least 50% metal powder (see, e.g. paragraph [0016]).

Independent Claim 33 recites a method for manufacturing guide vane segments for a gas turbine (e.g., see paragraph [0015]) comprising the steps of:

providing a plurality of guide vanes (e.g., see paragraph [0022], and guide vanes 19 in Fig. 2),

manufacturing a guide vane segment (e.g., see paragraph [0022], and vane segment 18 in Fig. 2) from the plurality of vanes (e.g., see paragraph [0022], and guide vanes 19 in Fig. 2) via powder metallurgy injection molding (e.g., see paragraph [0023]) from a homogenous material comprising at least 50% metal powder (see, e.g. paragraph [0016]).

Dependent claim 22 (argued separately) recites the method as recited in Claim 21,

wherein the molded bodies for the vanes are joined together prior to the debinding process in the green state to form one molded body for the vane segment [e.g., see paragraphs [0024] and [0025]].

Dependent claim 37 (argued separately) recites the method as recited in claim 33 wherein the metal powder comprises 50 to 70% of the homogenous material (e.g., see paragraph [0016]).

Dependent claim 38 (argued separately) recites the method as recited in claim 29 wherein the metal powder comprises 50 to 70% of the homogenous material (e.g., see paragraph [0016]).

Dependent claim 39 (argued separately) recites the method as recited in claim 17 wherein the metal powder comprises 50 to 70% of the homogenous material (e.g., see paragraph [0016]).

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Whether Claims 17 to 19, 29, 31 to 33 and 37 to 42 should have been rejected under 35 U.S.C. §103(a) as being anticipated by U.S. Patent No. 5,733,498 (Kawakami et al.) in view of U.S. Patent No. 2,796,660 (Irmann).

Whether Claims 21 to 23 should have been rejected under 35 U.S.C. §103(a) as being unpatentable over Kawakami et al. in view of Irmann and U.S. Patent No. 5,554,338 (Sugihara et al.)

Whether Claims 24 to 26 should have been rejected under 35 U.S.C. §103(a) as being unpatentable over Kawakami et al. in view of Irmann and U.S. Patent No. 6,551,551 (Gegel et al.)

Whether Claims 27 and 28 should have been rejected under 35 U.S.C. §103(a) as being unpatentable over Kawakami et al. in view of Irmann and GB 1 470 949 (Ford Motor Company, Ltd.)

Whether Claims 34 to 36 should have been rejected under 35 U.S.C. §103(a) as being unpatentable over Kawakami et al. in view of Irmann and U.S. Patent 6,890,370 (Merrick et al.)

VII. ARGUMENTS

Claim 17 to 19, 29, 31 to 33 and 37 to 42 were rejected under 35 U.S.C. §103(a) as being anticipated by U.S. Patent No. 5,733,498 (Kawakami et al.) in view of U.S. Patent No. 2,796,660 (Irmann).

Kawakami is directed to a silicon nitride sintered reaction body with small amounts of metal.

Irmann discloses aluminum light metal bodies, made of pure aluminum or aluminum alloys containing other metals. See col. 2, line 51 to 66. Irmann discloses cold and hot pressing and extruding the pure metal material.

Claim 17 recites:

manufacturing a vane segment from the plurality of vanes via powder metallurgy injection molding, the step of manufacturing including the steps of:

mixing a metal powder having a binding agent to form a homogeneous material, the metal powder accounting for at least 50% of the homogeneous material;

forming at least one molded body from the homogeneous material via injection molding,

subjecting the at least one molded body to a debinding process, and

compressing the at least one molded body via sintering to form the vane segment.

The present invention this claims *injection molding* using a homogeneous material made of a metal powder and *a binding agent*, and *the powder comprising at least 50% of the homogeneous mixture*.

As admitted by the Examiner, Kawakami is directed to sintered silicon nitride bodies that have small amounts of metal, and certainly not close to 50% of any homogeneous material.

Irmann is directed to using pure aluminum metal alloys that are not injection molded. See Irmann at col. 3, lines 5 to 14 and the Examples, for example.

Even if the two references could somehow be properly combined (which it is respectfully

submitted they cannot), substituting the Irmann homogenous powder as asserted would not result in the claimed invention of claim 17, since no binding agent would be present.

Moreover, the pure metals of Irmann, it is respectfully submitted, are not used for injection molding, and thus one of skill in the art would not have used to the pure metals of Irmann with the injection molding process for silicon nitrides disclosed in Kawakami.

In addition the whole purpose of Kawakami is directed to silicon nitride ceramic bodies, and there is no expectation or reason to have believed that such a process would be useful or useable with pure metals, or with metal powder that constitutes 50% of any homogeneous mixture. The sole reason for the proposed modification appears to be improper hindsight. In fact the proposed motivation “known for use in the powder metallurgy process” belies the fact that the claims call for *injection molding*.

Claims 29 and 33 recite parts made from or the method of injection molding with a homogenous material comprising at least 50% of a metal powder.

As argued above, the pure metals of Irmann, it is respectfully submitted, are not used for injection molding, and thus one of skill in the art would not have used to the pure metals of Irmann with the injection molding process for silicon nitrides disclosed in Kawakami.

In addition the whole purpose of Kawakami is directed to silicon nitride ceramic bodies, and there is no expectation or reason to have believed that such a process would be useful or useable with pure metals. The sole reason for the proposed modification appears to be improper hindsight.

Withdrawal of the rejections under 35 U.S.C. §103(a) to claims 17 to 19, 29, 31 to 33 and 37 to 42 thus is respectfully requested.

Claims 37, 38 and 39: Argued Separately

With further respect to claims 37, 38 and 39, the metal powder of any proposed combination of Kawakami and Irmann does not comprise from 50 to 70% of the homogeneous materia as claimed, but rather 100 percent.

Withdrawal of these rejections is respectfully requested for this reason as well.

Claim 22: Argued Separately

Claims 21 to 23 were rejected under 35 U.S.C. §103(a) as being unpatentable over Kawakami et al. in view Irmann and U.S. Patent No. 5,554,338 (Sugihara et al.)

In view of the above, withdrawal of the rejections under 35 U.S.C. §103(a) to claims 21 to 23 thus is respectfully requested.

With further respect to claim 22, which recites “wherein the molded bodies for the vanes are joined together prior to the debinding process in the green state to form one molded body for the vane segment,” it is respectfully submitted that such a step would not be used with the full metal sintering of Irmann.

CONCLUSION

It is respectfully submitted that the application is in condition for allowance. Favorable consideration of this appeal brief is respectfully requested.

Respectfully submitted,

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Dated: August 9, 2010

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APPENDIX A:

PENDING CLAIMS 17 to 19, 21 to 29, and 31 to 42
U.S. APPLICATION SERIAL NO. 10/564,076

Claim 17 (previously presented): A method for manufacturing vane segments for a gas turbine comprising the steps of:

providing a plurality of vanes,
manufacturing a vane segment from the plurality of vanes via powder metallurgy injection molding, the step of manufacturing including the steps of:
mixing a metal powder having a binding agent to form a homogeneous material, the metal powder accounting for at least 50% of the homogeneous material;
forming at least one molded body from the homogeneous material via injection molding,
subjecting the at least one molded body to a debinding process, and
compressing the at least one molded body via sintering to form the vane segment.

Claim 18 (previously presented): The method as recited in Claim 17, wherein the vane segment is designed as a guide vane segment and includes at least two guide vanes.

Claim 19 (previously presented): The method as recited in Claim 18, wherein the guide vane segment includes three or four guide vanes.

Claim 21 (previously presented): The method as recited in Claim 17, wherein, in that in order to manufacture one vane segment from at least two vanes,

a molded body for each vane is manufactured separately via injection molding, and
the molded bodies are joined together prior to the debinding process to form one molded body for the vane segment.

Claim 22 (previously presented): The method as recited in Claim 21, wherein the molded bodies for the vanes are joined together prior to the debinding process in the green state to form

one molded body for the vane segment.

Claim 23 (previously presented): The method as recited in Claim 21, wherein the one molded body for the vane segment is then subjected to a uniform debinding process and uniform sintering in the debinding and sintering steps.

Claim 24 (previously presented): The method as recited in Claim 17, wherein, in that to manufacture one vane segment from at least two vanes:

a molded body for each vane is manufactured separately via injection molding,
the molded bodies for the vanes undergo separate debinding processes, and
the molded bodies for the vanes are subsequently joined together to form one molded body for the vane segment.

Claim 25 (previously presented): The method as recited in Claim 24, wherein the molded bodies for the vanes are joined together in a presintered state to form one molded body for the vane segment.

Claim 26 (previously presented): The method as recited in Claim 24, wherein the one molded body for the vane segment is then subjected to uniform sintering in the sintering step.

Claim 27 (previously presented): The method as recited in Claim 17, wherein, to manufacture one vane segment from at least two vanes, a joint molded body for all vanes of the vane segment is manufactured via injection molding.

Claim 28 (previously presented): The method as recited in Claim 27, wherein the joint molded body for the vane segment is subjected to a uniform debinding process and uniform sintering.

Claim 29 (previously presented): A component for a gas turbine, comprising
a guide vane segment manufactured from a plurality of guide vanes via powder

metallurgy injection molding from a homogeneous material comprising at least 50% metal powder.

Claim 31 (previously presented): The component as recited in Claim 29, wherein the guide vane segment includes three or four guide vanes.

Claim 32 (previously presented): The method as recited in claim 29 wherein the plurality of guide vanes are connected via an inner cover band and an outer cover band.

Claim 33 (previously presented): A method for manufacturing guide vane segments for a gas turbine comprising the steps of:

- providing a plurality of guide vanes,
- manufacturing a guide vane segment from the plurality of vanes via powder metallurgy injection molding from a homogenous material comprising at least 50% metal powder.

Claim 34 (previously presented): The method as recited in claim 33 wherein the metal powder is selected from one of a titanium alloy and nickel alloy.

Claim 35 (previously presented): The method as recited in claim 29 wherein the metal powder is selected from one of a titanium alloy and nickel alloy.

Claim 36 (previously presented): The method as recited in claim 17 wherein the metal powder is selected from one of a titanium alloy and nickel alloy.

Claim 37 (previously presented): The method as recited in claim 33 wherein the metal powder comprises 50 to 70% of the homogenous material.

Claim 38 (previously presented): The method as recited in claim 29 wherein the metal powder comprises 50 to 70% of the homogenous material.

Claim 39 (previously presented): The method as recited in claim 17 wherein the metal powder comprises 50 to 70% of the homogenous material.

Claim 40 (previously presented): The method as recited in claim 33 wherein the gas turbine is part of an aircraft engine.

Claim 41 (previously presented): The method as recited in claim 29 wherein the gas turbine is part of an aircraft engine.

Claim 42 (previously presented): The method as recited in claim 17 wherein the gas turbine is part of an aircraft engine.



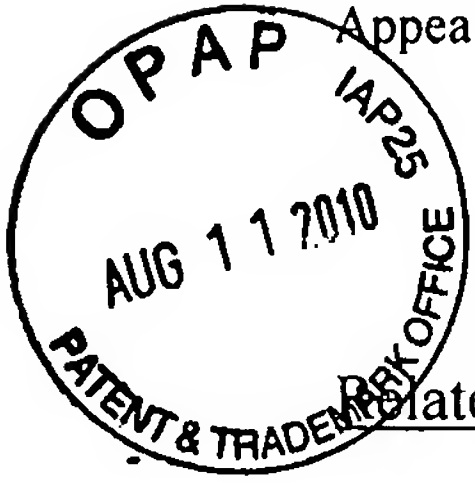
APPENDIX B

Evidence Appendix under 37 C.F.R. §41.37 (c) (ix):

No evidence pursuant to 37 C.F.R. §§1.130, 1.131 or 1.132 and relied upon in the appeal

has been submitted by appellants or entered by the examiner.

Appeal Brief



APPENDIX C

Related proceedings appendix under 37 C.F.R. §41.37 (c) (x):

As stated in "2. RELATED APPEALS AND INTERFERENCES" of this appeal brief, appellants, their legal representatives, and assignee are not aware of any appeal or interference that directly affects, will be directly affected by, or will have a bearing on the Board's decision in this appeal.